Non-Food and energetic use of plants from Mediterranean and tropical areas

AGROENERGY FROM NORTH, IMPACT ON SOUTH

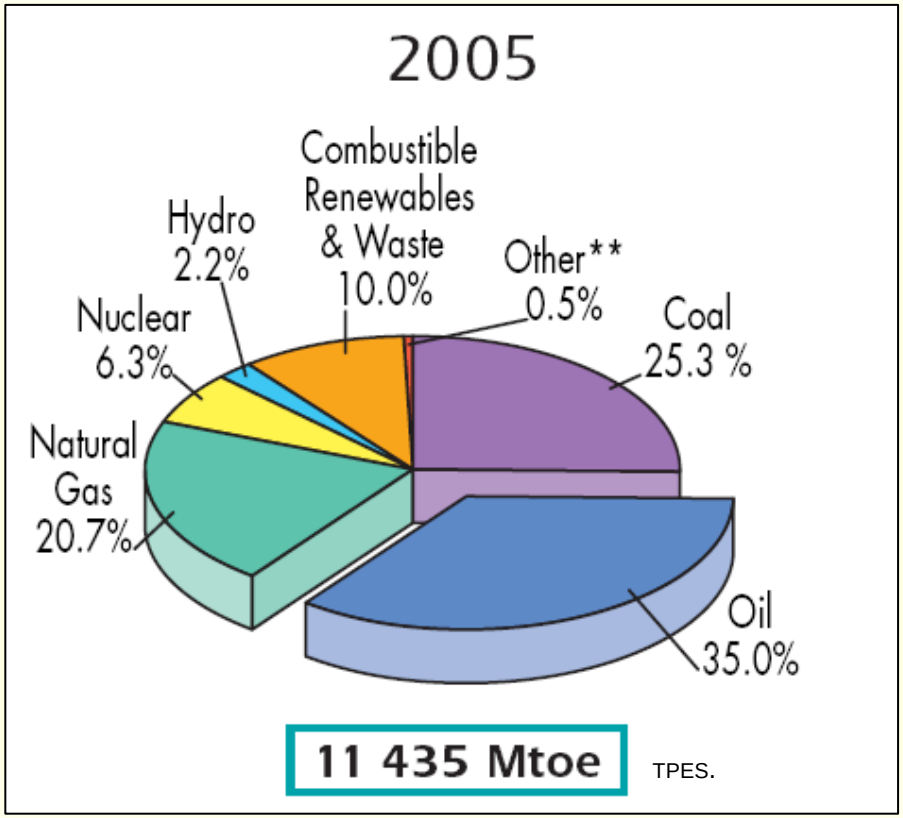
Gilles Vaïtilingom

& Alain Liennard

AGROENERGY IN THE NORTH = MAINLY BIOFUELS

- **Key World Energy Stats**

Total Primary Energy Supply In the World - 2005

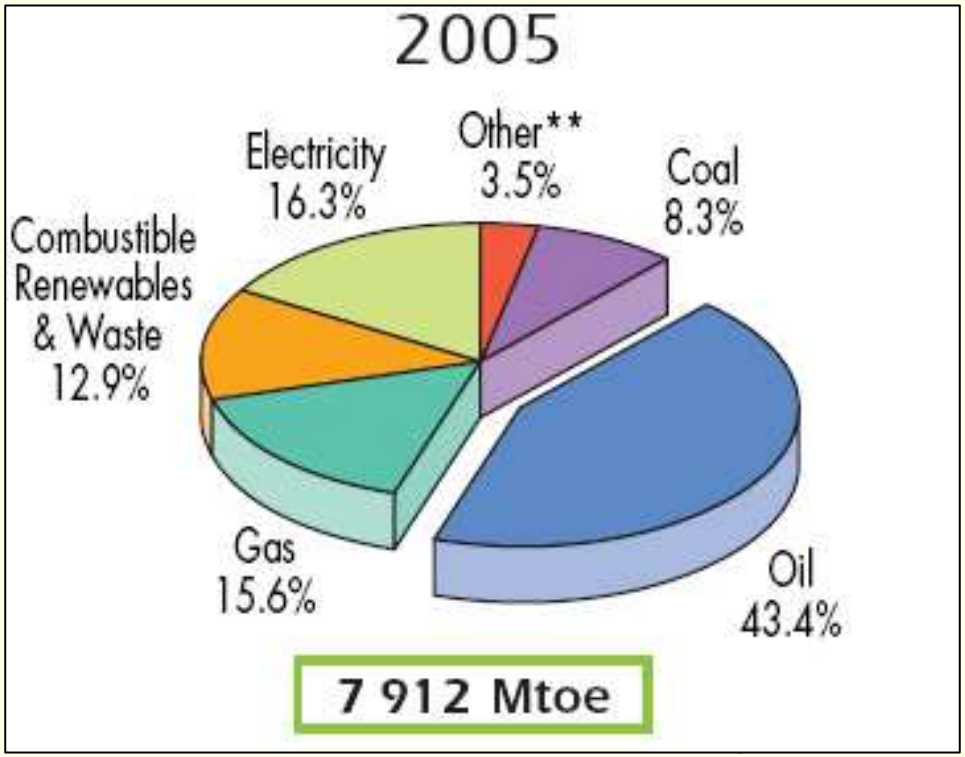


** : wind, solar, geothermal, ...

✋: ***81 % from Fossil Resources***

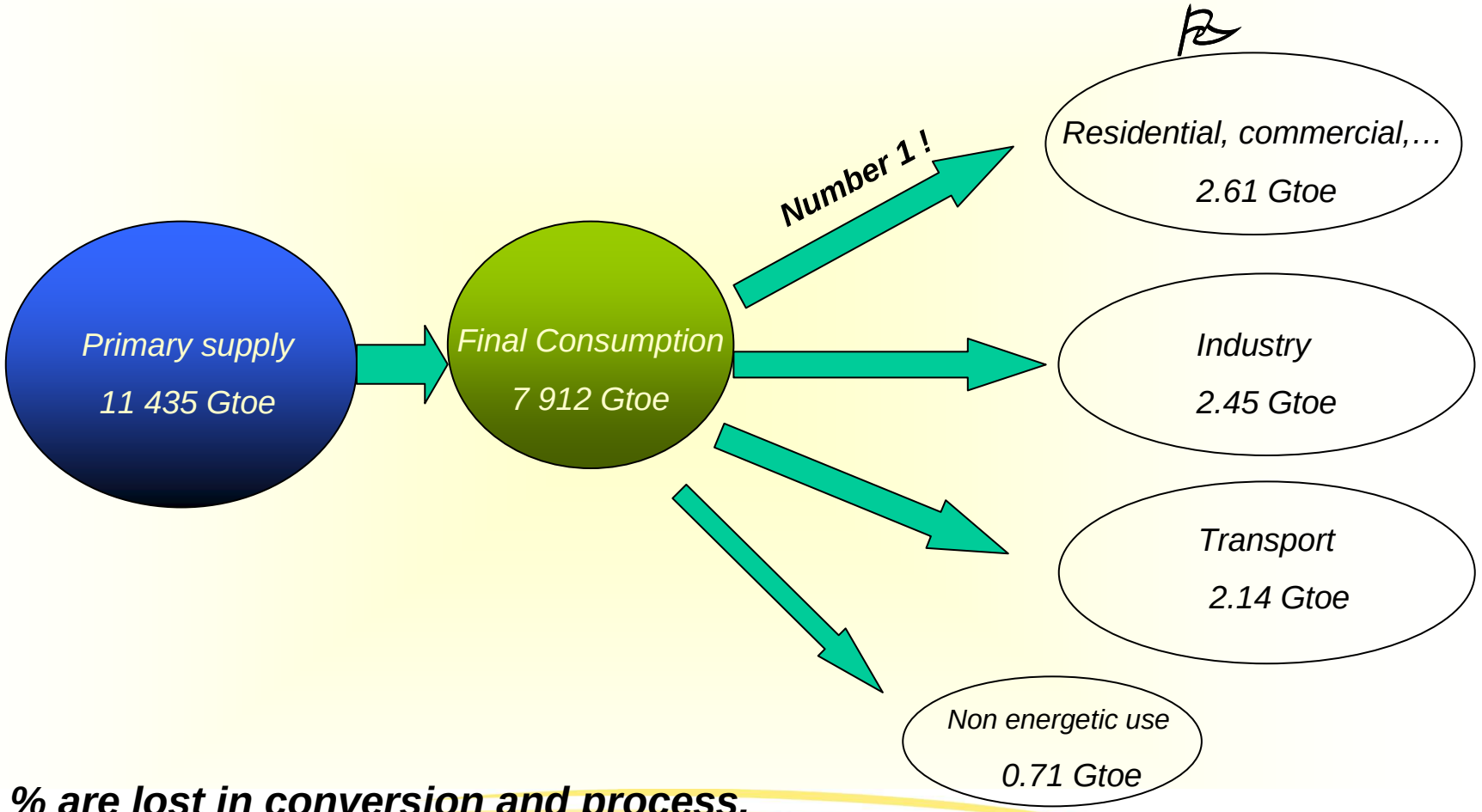
Source : IEA, 2007.

Total Final Consumption In the World - 2005



Source : IEA, 2007.

Total Final Consumption
In the World - 2005



✋: ***31 % are lost in conversion and process.***

Source : IEA, 2007.

AGROENERGY INTEREST

Before 2050,

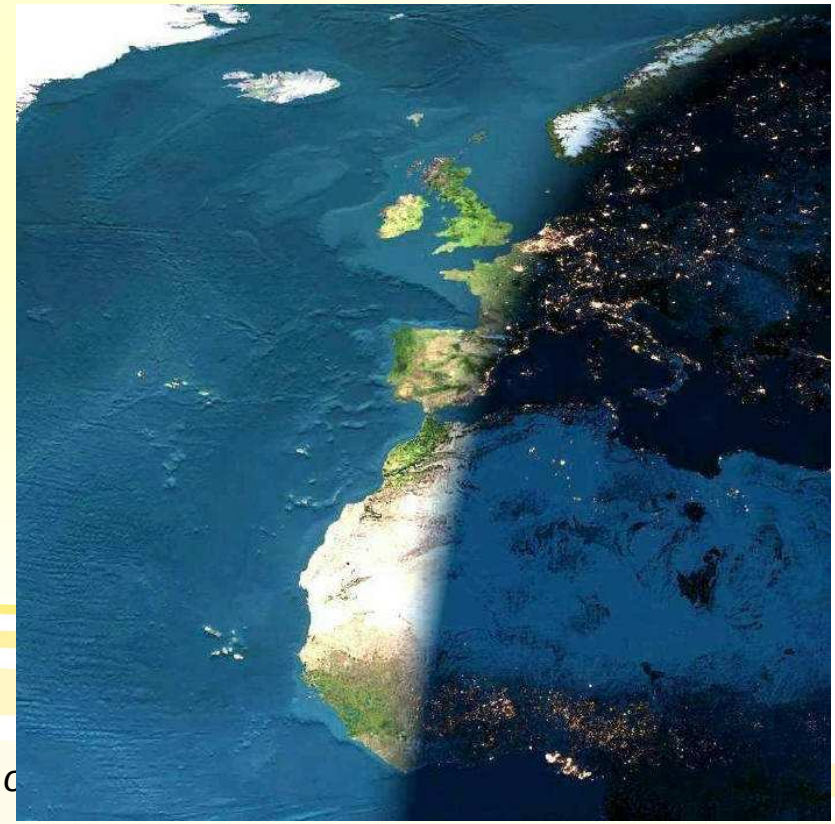
it is a duty and a necessity to look for solutions by all means:

- to improve our energetic efficiency
- to stop wasting energy
- to develop renewable resources
- To reduce GHG

Source : R. Olivès
Univ. Perpignan
PROMES-CNRS

We all need Energy

- food
- dress
- heating
- cooling
- health
- entertainment
- work
- …



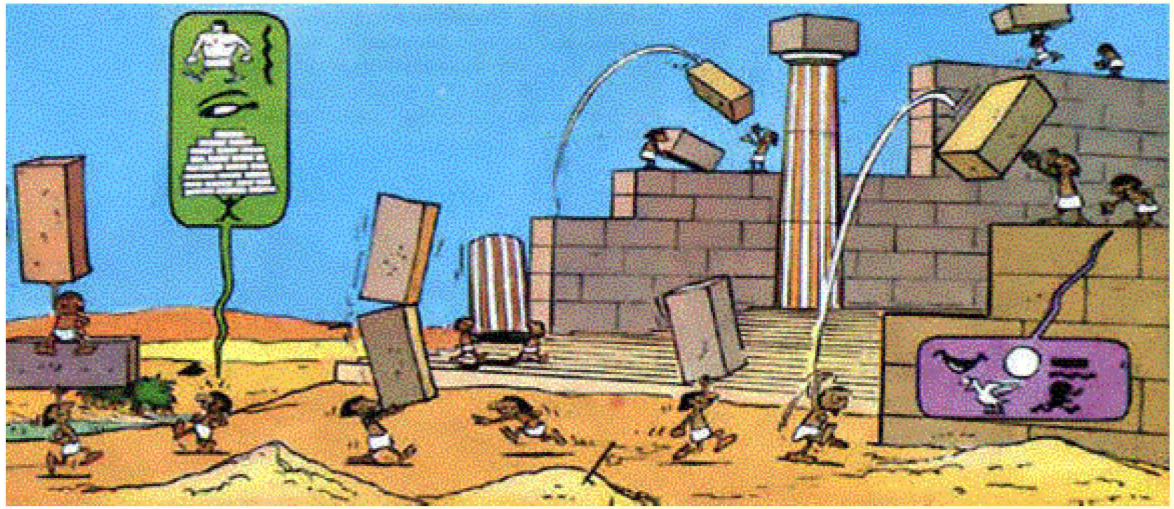
Source : R. Olivès
Univ. Perpignan
PROMES-CNRS

We are Energy eaters

Energy Resource → Needs

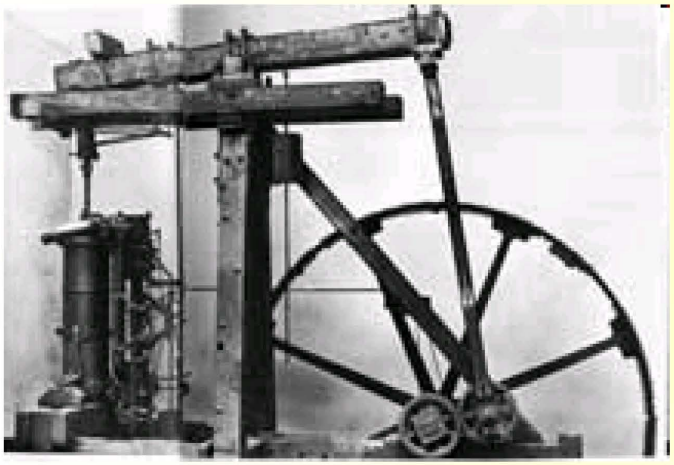
Source : R. Olivès
Univ. Perpignan
PROMES-CNRS

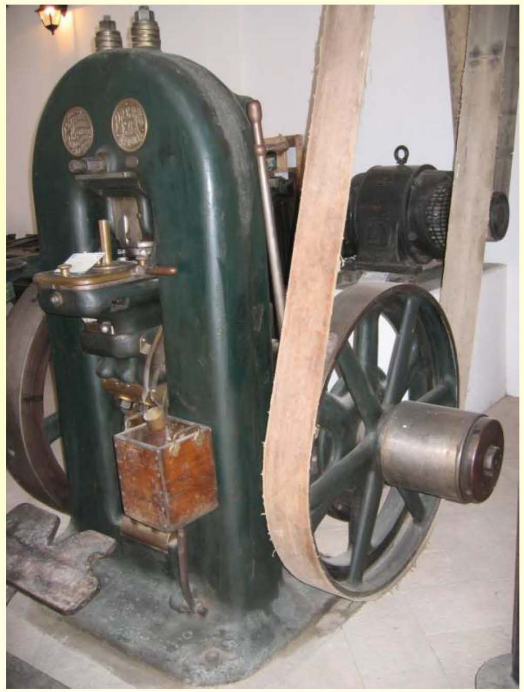
We need more and more



Source : R. Olivès
Univ. Perpignan
PROMES-CNRS

More and more Power





Source : R. Olivès
Univ. Perpignan
PROMES-CNRS

MORE AND MORE POWER

Annual Average Growing Rate of Energy Consumption

Oil: + 1.3 %

Coal: + 3 %

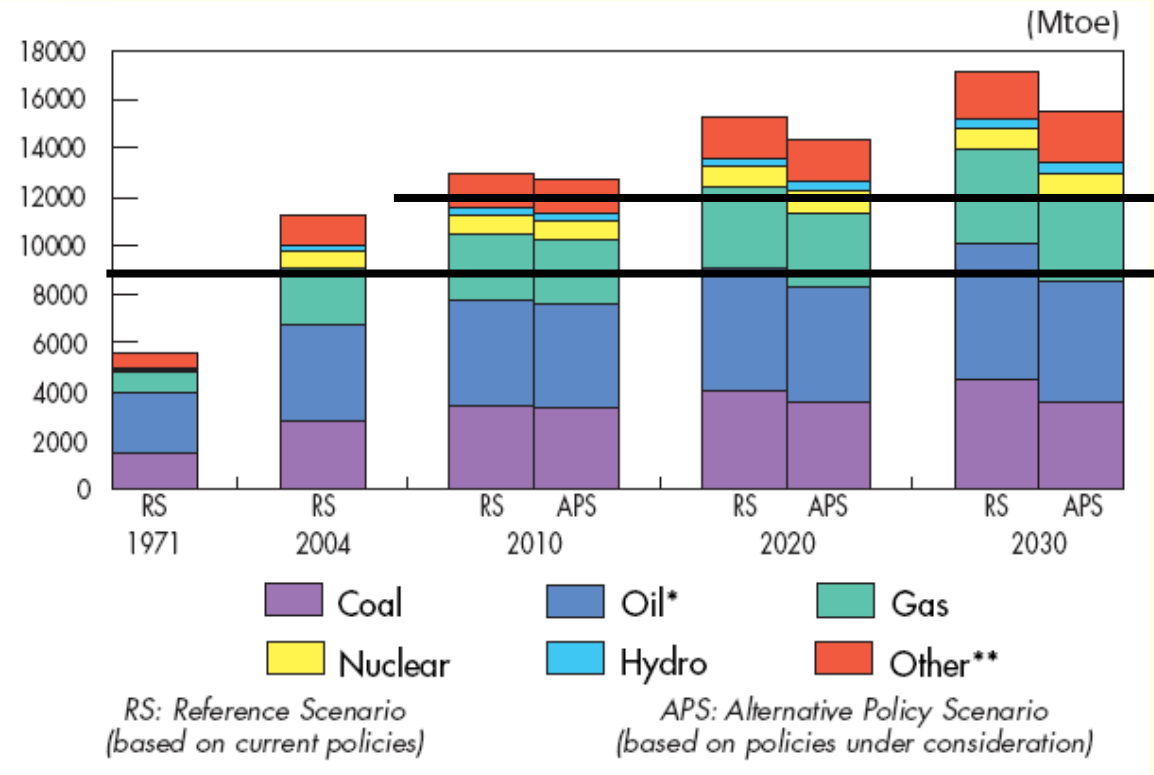
Natural Gas: + 2 %

Electricity : + 3.2 %

Total Primary Energy Supply: + 50 % in 2030, + 100 % in 2050
TPES

Source : IEA, 2007.

Outlook for World TPES in 2030



2008

1992. (RIO, Earth Summit)

: In 2030, transports will consume 3900 Mtoe of oil, EQUIVALENT TO 2007 ENTIRE WORLD OIL PRODUCTION.

Source : IEA, 2007.

RENEWABLE ENERGIES

Mostly applicable to domestic, commercial and industry

Biogas

Biomass Gasification

NEW AND RENEWABLE ENERGIES

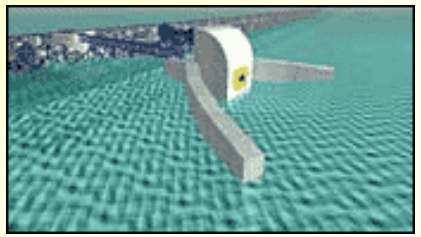
- ***Mostly applicable to domestic, commercial and industry***

Solar Stirling engine

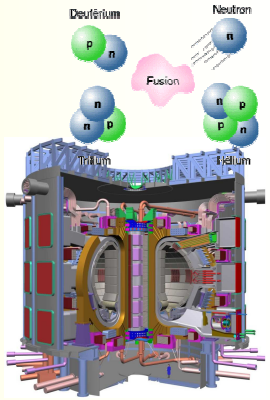
Geothermal

Pelamis (Ocean Power Delivery)

hydroliennes

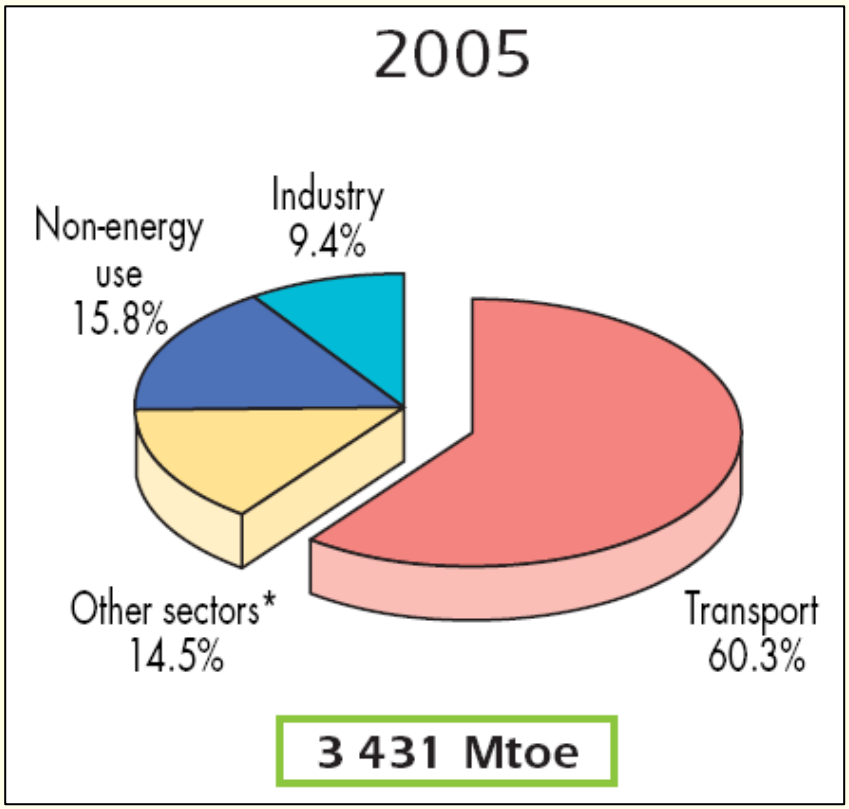


Energy from waves



Fusion : ITER

Shares of World Oil Consumption



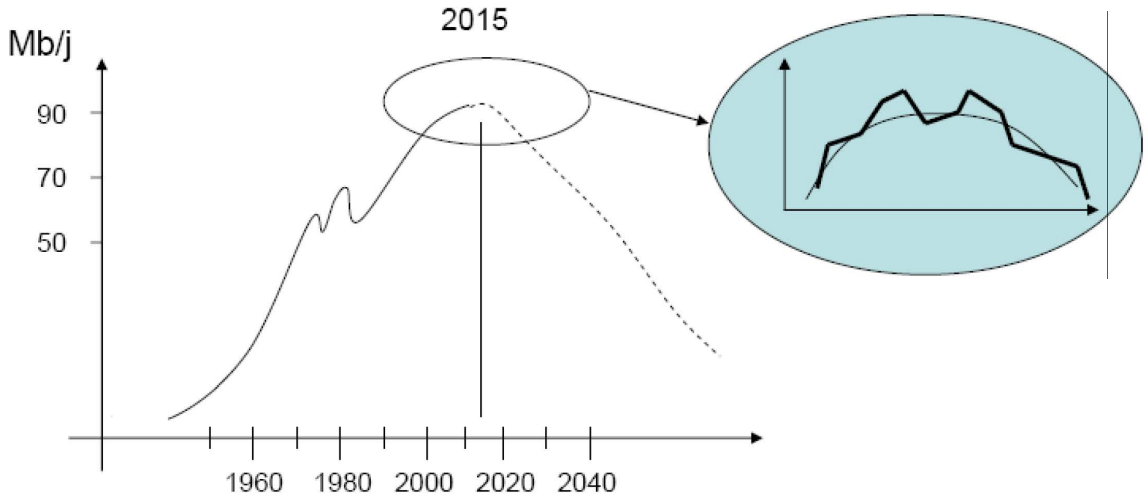
☹ **TRANSPORTS ARE RELYING ON OIL AT 96 %**

Source : IEA, 2007.

Peak Oil coming soon ?

La production de pétrole va bientôt entrer dans sa phase de déclin continu

Pic de production : maximum de la production journalière de pétrole

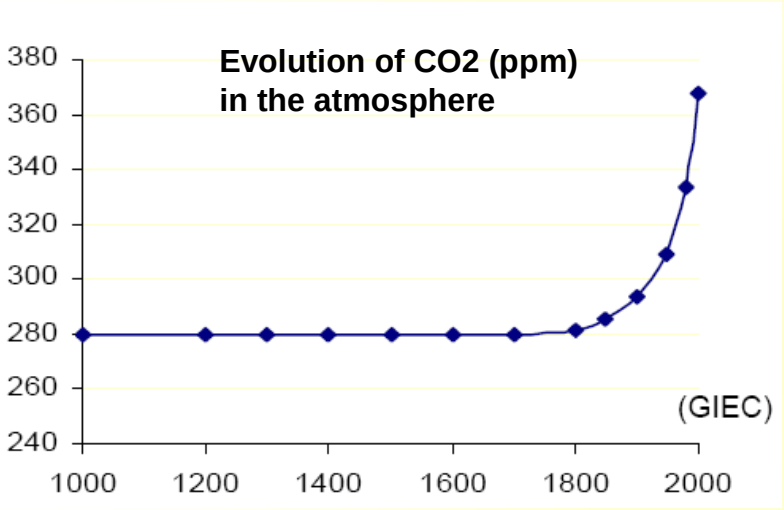


Courbe de Hubbert appliquée à la production mondiale (Laherrère, 2004)

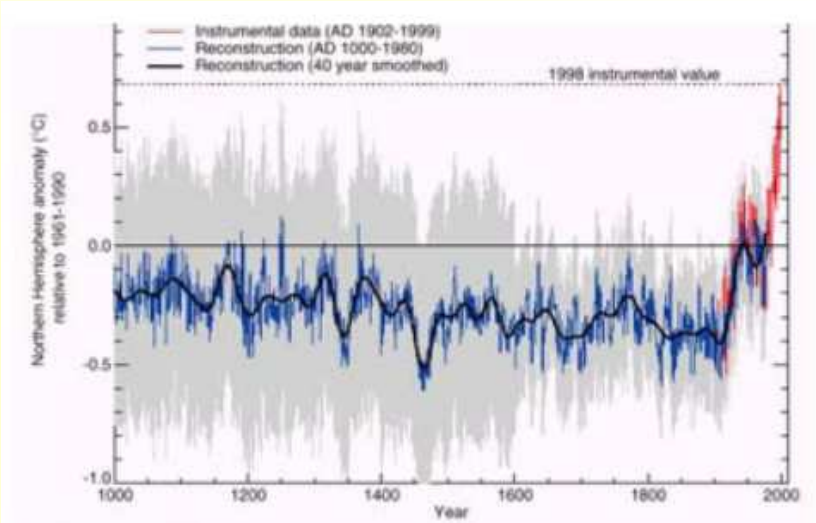
Source : R. OLIVES (PROMES).

Source : R. Olivès
Univ. Perpignan
PROMES-CNRS

Global Warming / GHG

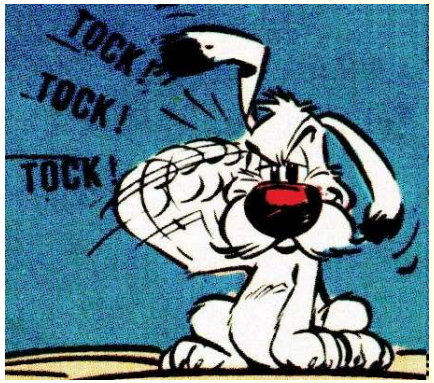


Evolution of temperature in the atmosphere (ref. 1961)



Source : R. OLIVES (PROMES).

Availability : $\frac{\text{Reserves}}{\text{production}}$



OIL	40 years
NAT. GAS	60 years
COAL	230 years
uranium	60 ans…
RENEWABLE	unlimited !!!

Source : R. OLIVES (PROMES).

Due to his anxiety on oil scarcity, the North is developing AgroEnergy mainly to produce new substitute Fuels.

- ***First Generation*** *fuels from biomass: coming from agriculture*

(BioDiesel from vegetable oils & Bioethanol)

- ***Second Generation*** *fuels from biomass: coming from dedicated energy plantations.*

- ***Third Generation*** *fuels: under investigation (MicroAlgaes,…)*

FUELS - WORLD CONSUMPTION

- World consumption of oil: 80 millions of barrels/day (2/3 for transports)
- 12 720 millions litres or 10 176 millions kg = 10,17 millions of toe/day
- transports = **6.78** millions toe/day, or: 2475 millions toe/year)

FIRST GENERATION BIOFUELS

- Whole Palm oil production can run world transport for less than 6 days !!! (1 tonne oil = .92 toe)
- All vegetable oils can run it during 17 days.
- Brazilian Ethanol can run it 1 day and 9 hours.
- All World Ethanol can run it during 3 days and 18 hours !

We are not at the same level !

But they are well adapted and opportune solutions at local level for welfare and sustainable development.

SECOND GENERATION BIOFUELS

S

	Bio carburants	*l/ha*	*GJ/ha*
1st	Tournesol biodiesel	1,000	35.7
	Soja biodiesel	500-700	17.8- 25.0
	Colza biodiesel	1,200	42.8
	Blé éthanol	2,500	53
	Mais éthanol	3,100	65.7
	Betterave éthanol	5,500	116.6
	Cane à sucre éthanol	5,300-6,500	112.4- 137.8
2nd	FT biodiesel plantation eucalyptus	13,500-18,000	463.1- 617.4
	Méthanol plantation eucalyptus	49,500-66,000	772.2- 1029.6
	DME plantation eucalyptus	45,000- 60,000	846.0- 1128.0

POTENTIAL IS ESTIMATED AT 25 % OF WORLD OIL CONSUMPTION IN 2030

AGROENERGY FROM NORTH

IMPACT ON SOUTH

- *FUEL VERSUS FOOD ?*
- *DOES AGROENERGY CAN GENERATE INCOME IN AND FOR THE SOUTH ?*
- *DOES AGROENERGY CAN INSURE ENERGY EQUITY ?*
- *CAN AGROENERGY IN THE SOUTH CAN BE SUSTAINABLE ?*

IF QUESTIONS ARE THE SAME IN NORTH AND SOUTH,

ANSWERS ARE NOT !

IMPACT ON SOUTH

WHEN NORTH IS IMPROVING 1st GENERATION FUELS STANDARDS, AND INVESTIGATING 2nd GENERATION:

- ***IT REVEALS TO COUNTRIES WITH LOW FOSSIL CONSUMPTION, AND SMALL IMPACT ON GHG EMISSION, THAT AGROENERGY IS AN ACTUAL OPORTUNITY,***
- ***PARTICULARLY FOR LOCAL USAGE,***
- ***AND CAN HAVE A SIGNIFICANT IMPACT ON AGRICULTURE AND FOOD SECURITY.***
- ***AND THAT THEY MUST DEVELOP THIER OWN 2nd GENERATION FUELS !***

IMPACT ON SOUTH

- ***EXAMPLE: BURKINA FASO*** ***(DRY ZONE)***

- *FUEL FINAL CONSUMPTION = 520 000 TOE (WOOD = 2.6 MTOE !)*

- *IN 2020, CAN REACH 25 % OF DIESEL FUEL SUBSTITUTION WITH ITS OWN VEGETABLE OILS*

- *165 000 HA OF JATROPHA AND 45 000 HA OF SUGAR CANE CAN LEAD TO FUEL SELF SUFFICIENCY*

IMPACT ON SOUTH

- ***EXAMPLE: CAMEROON (HUMID & DRY ZONE)***

- *FUEL FINAL CONSUMPTION = 1,1 Mtoe*

- *CRUDE PALM OIL PRODUCTION: 200 000 Tonnes, food demand 250,000 Tonnes*
- *POTENTIAL: 400 000 Tonnes.*

☞ *PALM OIL INDUSTRIES CAN BE FUEL SELF SUFFICIENT BY DIVERTING 10 % OF THEIR CPO PRODUCTION.*

IMPACT ON SOUTH

MANY COUNTRIES ARE ON THE WAY TOWARD AGROENERGY:

- *PACIFIC ISLAND COUNTRIES*
- *AFRICAN COUNTRIES*
- *SOUTH AMERICA, CARRIBEAN*
- *INDIA,*
- *…*

- *PACIFIC COUNTRIES: Shared proposed purchase of petroleum products to negotiate better prices ; development of Renewable and Biomass Energy policy.*
- *AFRICAN COUNTRIES: warning and consideration from North ! South pushing jatropha plantation at farmers level*
- *New opportunity for rural electrification based on local resources, i.e. able to restart or generate local activities.*

IMPACT ON SOUTH

CONCLUSION

• ***The Development of Agroenergy in the North has revealed***

The potential of the South in term of access to energy,

• ***Of opportunities for local development in the poorest zones and consolidation of food crops and cash crops.***

• ***But in the perspective of 2nd generation Biomass Fuels the problem of energy equity is still arising***

• ***New opportunity for rural electrification based on local resources, i.e. able to restart or generate local activities.***

THANK YOU FOR ATTENTION!

MERCI DE VOTRE ATTENTION !